

13 ATTACHMENT 6 - MONITORING, ASSESSMENT, AND PERFORMANCE MEASURES

13.1 Plum Basin Project

This project is consistent with the Tulare Lake Basin Plan through the reduction of groundwater overdraft and the betterment of groundwater quality. A ground water monitoring program will be put in place that will consist of District staff recording monitoring well levels and flow measurement in order to track recharge and regulation operations and groundwater levels. Two new monitor wells will be incorporated into the District's existing network of groundwater monitoring network that are sounded for depth to groundwater every spring and fall. Also, the two new monitoring wells will be outfitted with data loggers that automatically read the depth to water near the basin facilities once every day for a far more detailed picture of local groundwater conditions. Also a SCADA monitoring system will be installed on the new turnout facilities to the basins so that real time information can be viewed at the District office and changing conditions can be remotely monitored so that system fluctuations can be addressed and spills avoided. Local groundwater levels and flow measurement at individual turnouts will be monitored so that a complete accounting of the additional water supply generated by the new facility can be regularly quantified and reported to the Tulare ID Board of Directors. This monitoring will help in determining the following parameters:

- 1) Long-term recharge rate for the facility;
- 2) Effect of groundwater recharge on shallow groundwater levels beneath and adjacent to the facility;
- 3) Effect of groundwater recharge on local groundwater quality;
- 4) Change in the rate of local groundwater decline;
- 5) Benefit to Tulare ID's groundwater overdraft;
- 6) If City of Tulare's average target of 12,000 AF/year or recharged water is accomplished;
- 7) If Tulare ID's recharge capacity in District facilities is increased by 1,100 AF/month;
- 8) Adjacent property owners are negatively impacted by project;
- 9) Evaluate development of operation and maintenance procedures to maintain or enhance recharge rates; and

KAWEAH RIVER BASIN IRWM GROUP 2011 IMPLEMENTATION GRANT PROPOSAL

Kaweah Delta WCD

10) Evaluate need for measures to reduce groundwater mounding should it be found to adversely affect properties or public facilities adjacent to the facility.

Project Goals	Desired Outcomes	Output Indicators	Outcome Indicators	Measurement Tools and Methods	Targets
Increase regional groundwater recharge capacity	Development of new groundwater recharge facilities	Successful construction and use by Tulare ID of Plum Basin Project	Water meter readings and depth to groundwater readings	Recharge rate calculated from water delivery numbers over differing periods of time	Increase recharge capacity through Tulare ID facilities by 1,100 AF/month.
Conserve available surplus water on the Kaweah River	Development of new groundwater recharge facilities	Completed project. Amount of water diverted and recharged at the site	Measurement of water diverted into project basins	Meters installed at recharge facilities and turnouts, documentation of water supplied to facility	Average annual amount of 12,000 AF of additional groundwater recharge
Import surface water for the City of Tulare to offset groundwater extractions by the City	Develop a banking relationship between the City of Tulare and Tulare ID	Surface water delivered to Tulare ID above what would have been possible without City of Tulare partnership.	Measurement of water diverted into project basins	Use of the facility and water accounting will be monitored so that recharge efforts by Tulare ID and those funded by the City of Tulare are tracked separately	City of Tulare's avg. annual groundwater pumpage equals the avg. annual City recharge at Project site.

KAWEAH RIVER BASIN IRWM GROUP 2011 IMPLEMENTATION GRANT PROPOSAL

Kaweah Delta WCD

Project Goals	Desired Outcomes	Output Indicators	Outcome Indicators	Measurement Tools and Methods	Targets
Benefit water supply reliability for City of Tulare	City of Tulare groundwater pumps will be protected from declining groundwater levels	Depth to groundwater measurements at City of Tulare groundwater extraction wells	City of Tulare maintenance logs for groundwater wells	Groundwater levels in the City of Tulare's wells will be compared to regional levels	Rate of decline in groundwater levels in the City of Tulare will be less than the region
Further cooperative efforts between the City of Tulare and Tulare ID	Mutual goals of City of Tulare and Tulare ID will be met through project	Greater surface water deliveries to growers and recharge in Tulare ID than was previously possible	Avg. annual surface water delivered to District will rise over neutral period	Analysis of Tulare ID annual surface water delivery records and comparison with previous years	Average annual amount of 12,000 AF of additional groundwater recharge
Reduce local groundwater overdraft	To reduce the rate of groundwater decline within Tulare ID during times of below average surface water availability	Amount of water recharged, depths to groundwater within District and at Project site	Hydrographs of Tulare ID monitor wells near project will show less decline in dry years	Groundwater monitoring using the proposed monitoring well canvass to identify mounding and available storage	Average annual amount of 12,000 AF of additional groundwater recharge

13.2 Water Reuse Pipeline Project

This project is consistent with the Tulare Lake Basin Plan through the reduction of groundwater overdraft, accomplishing wastewater reclamation and the reduction of discharges to navigable waters. A monitoring program will be put in place that will consist of District and City of Tulare staff recording monitoring well levels and inflow and outflow flow measurement in order to track recharge and delivery operations and groundwater levels. Flow meters will be incorporated into the design at input and delivery points. The Tulare ID's and City of Tulare's existing groundwater monitoring

KAWEAH RIVER BASIN IRWM GROUP 2011 IMPLEMENTATION GRANT PROPOSAL

Kaweah Delta WCD

network will be sounded for depth to groundwater every spring and fall. Local groundwater levels and flow measurement at individual turnouts will be monitored so that a complete accounting of the additional water supply generated by the new facility can be regularly quantified and reported. This monitoring will help in determining the following parameters:

- 1) Effect of groundwater recharge on local groundwater quality;
- 2) Change in the rate of local groundwater decline;
- 3) Benefit to City of Visalia's and Tulare ID's groundwater overdraft;
- 4) If agreement between City of Visalia and Tulare ID is met;

Project Goals	Desired Outcomes	Output Indicators	Outcome Indicators	Measurement Tools and Methods	Targets
Reduce Tulare ID groundwater well usage	"In lieu" groundwater recharge to local groundwater basin	Existing private wells have lower pumping rates	Depth to Groundwater levels in the project vicinity decrease	Sounding wells on bi-annual intervals	Rate of groundwater level decline is reduced after project initiated
Increase groundwater reliability for the City of Visalia	Reduction of overdraft in vicinity of Visalia wells	Groundwater level readings	Depth to Groundwater levels in Visalia wells	Sounding wells on bi-annual intervals	Rate of groundwater level decline is reduced after project initiated

KAWEAH RIVER BASIN IRWM GROUP 2011 IMPLEMENTATION GRANT PROPOSAL

Kaweah Delta WCD

Project Goals	Desired Outcomes	Output Indicators	Outcome Indicators	Measurement Tools and Methods	Targets
Import surface water for the City of Visalia to be recharged in identified locations east of Visalia that will benefit the City's groundwater wells	Develop a water transfer relationship between the City of Visalia and Tulare ID	Surface water delivered to Tulare ID above what would have been possible without City partnership.	Measurement of water diverted into identified recharge locations for Visalia	Use of the facility and water accounting will be monitored so that recharge efforts by Tulare ID and those funded by the City of Visalia are tracked separately	City of Visalia's avg. annual groundwater pumpage equals Visalia's avg. annual recharge.
Improved City of Visalia wastewater treatment plant delivers high quality water supplies to Tulare ID	High quality water resources are delivered to Tulare ID for use by their growers and for groundwater recharge	Groundwater quality samples in Tulare ID continue to show high groundwater quality or improving quality	Water quality tests at the wastewater treatment plant show treated water is produced to a suitable quality for Tulare ID use	Water quality tests at the wastewater treatment plant analyzed weekly and groundwater quality samples analyzed quarterly	Improved City of Visalia wastewater treatment plant delivers resources similar to Kaweah River quality
Tulare ID water resources will be made more reliable in dry years	The yield from the delivered treated wastewater will be more in dry years than would have been available from the transferred supplies to City of Visalia	The available amount of surface water transferred to intentional recharge sites in a dry year	The measured amount of treated surface water delivered to Tulare ID in dry years	Comparison of available amounts in a dry year	Tulare ID hopes to receive significantly more water in dry years than would be transferred to intentional recharge sites

KAWEAH RIVER BASIN IRWM GROUP 2011 IMPLEMENTATION GRANT PROPOSAL

Kaweah Delta WCD

Project Goals	Desired Outcomes	Output Indicators	Outcome Indicators	Measurement Tools and Methods	Targets
City of Visalia will acquire significantly more water resources in wet years	The yield from the delivered treated wastewater will be more in dry years than would have been available from the transferred supplies to City of Visalia	The measured amount of treated surface water delivered to Tulare ID in dry years	The available amount of surface water transferred to intentional recharge sites in a dry year	Comparison of available amounts in a wet year	City of Visalia hopes to receive significantly more water in wet years than would be transferred to Tulare ID

13.3 Paregien Basin Project

This project is consistent with the Tulare Lake Basin Plan through the reduction of groundwater overdraft and the betterment of groundwater quality. A monitoring program will be put in place that will consist of Kaweah Delta WCD staff recording monitoring well levels and flow measurement in order to track recharge operations, facility maintenance, groundwater levels, groundwater quality, and flood layoff. The network of monitoring wells and the inflow/outflow flow rates will be monitored so that a complete water balance can be estimated for the project site. Also incidences of flood damage will be recorded by the City of Farmersville public works department and reported to Kaweah Delta WCD so that flood protection estimates can be validated over time. Watermaster reports will be reviewed annually to show the impact to existing water rights that the temporary diversion of irrigation supplies had on the downstream water right holder and a description will be generated as to how the water right holder was compensated. Seasonal monitoring will be recorded of the habitat developed at the offstream basin location in the form of pictures and a written description by Kaweah Delta WCD staff. This monitoring will help in determining the following parameters:

- 1) Determine long-term recharge rate for the facility;
- 2) Evaluate the effect of groundwater recharge on shallow groundwater levels beneath and adjacent to the facility;

KAWEAH RIVER BASIN IRWM GROUP 2011 IMPLEMENTATION GRANT PROPOSAL

Kaweah Delta WCD

- 3) Evaluate development of operation and maintenance procedures to maintain or enhance recharge rates;
- 4) Evaluate need for measures to increase recharge rates, should long-term rates be found inadequate;
- 5) Evaluate need for measures to reduce groundwater mounding should it be found to adversely affect properties or public facilities adjacent to the facility;
- 6) Evaluate the ability to monitor project operations and to allow controls so that the project accomplishes the goals of developing additional water supplies while not negatively affecting neighboring landowners;
- 7) Evaluate effect of groundwater recharge on local groundwater quality;
- 8) Determine the level of protection provided to the City of Farmersville;
- 9) Evaluate the relative health of the restored habitat on the project property;
- 10) Evaluate the exchange agreement developed as part of the project that compensates the downstream water right holder to temporary storage and recharge of water supplies in Deep Creek.

Project Goals	Desired Outcomes	Output Indicators	Outcome Indicators	Measurement Tools and Methods	Targets
Increase groundwater storage	Provide recharge capacity for additional storage	Completion of recharge facilities	Groundwater levels in the project vicinity	Groundwater monitoring with onsite monitoring wells to identify mounding and available storage.	Recharge 10,000 AF of additional groundwater
Reduce local groundwater overdraft	To reduce the rate of groundwater decline within Tulare ID during times of below average surface water availability	Amount of water recharged, depths to groundwater within District and at Project site	Hydrographs of Tulare ID monitor wells near project will show less decline in dry years	Groundwater monitoring using the proposed monitoring well canvass to identify mounding and available storage	Average annual amount of 12,000 AF of additional groundwater recharge

KAWEAH RIVER BASIN IRWM GROUP 2011 IMPLEMENTATION GRANT PROPOSAL

Kaweah Delta WCD

Project Goals	Desired Outcomes	Output Indicators	Outcome Indicators	Measurement Tools and Methods	Targets
Minimize flooding damage by impounding some floodwaters	New facility that can impound floodwaters and thereby reduce the potential for flood related damage downstream of the project site	New facility capable of impounding water and measuring output through structure	Reduced flood damage to downstream City of Farmersville	Water measurement facilities on impounding structure	Protect City from flood damage up to a 50 year storm
Increase knowledge of the local geology and hydrogeology	Gain new information of performance of facility and design improvements	Completion of recharge facilities	Monitoring groundwater levels in the project vicinity, infiltration rates	Groundwater monitoring of adjacent wells to identify mounding and available storage	New knowledge of project area, and application for development in other areas
Develop a sustainable restored habitat on the project site	Restored habitat in constructed basin in southeast of property would be maintained and thrive as intended	Vegetation plantings appear to be being used by appropriate species	Survival rate for plantings is high and	Site visits, pictures and descriptions of what the restored habitat looks like	At the end of three years the restored habitat is still viable and sustained without significant modification

13.4 Oakes Basin Habitat Improvement Project

This project is consistent with the Tulare Lake Basin Plan through the implementation of watershed management activities by local agencies. A monitoring program will be put into place that will allow Kaweah Delta WCD to track the growth and propagation of planted riparian habitat. This will include tracking water use from the on-site well, and seasonal photographs to compare annual growth to previous years. Plant death rate will also be monitored to aide in identifying the cause. These monitoring tasks will identify when the goal of a self-sustaining habitat has been reached.

KAWEAH RIVER BASIN IRWM GROUP 2011 IMPLEMENTATION GRANT PROPOSAL

Kaweah Delta WCD

Project Goals	Desired Outcomes	Output Indicators	Outcome Indicators	Measurement Tools and Methods	Targets
Establish riparian vegetation	Install irrigation system from existing well to provide water until plants are firmly rooted	Vegetation thriving in provided conditions	Low mortality rate of planted vegetation	Flow measurement of well, seasonal photos to chart growth,	Maintain 90% of planted vegetation
Efficient use of pumped water	Install irrigation system from existing well to provide water until plants are firmly rooted	Less water required from well	Less water required from well	Flow measurement at well	Maintain 85% irrigation efficiency

13.5 Groundwater Quality Protection and Investigation

This project is consistent with the Tulare Lake Basin Plan through the protection of groundwater quality, the furtherance of protective well standards and the identification of water quality concerns throughout the region. The primary benefit attained through this project is the removal of potential conduits (abandoned wells) through which groundwater contamination could occur. Also, this project will generate potential solutions for identified water supply and quality issues identified and prioritized through the project. To ensure that these goals are met the following methods presented in the table will be use.

Project Goals	Desired Outcomes	Output Indicators	Outcome Indicators	Measurement Tools and Methods	Targets
Eliminate many potential contamination conduits to local groundwater in Disadvantaged Communities	Many residents of disadvantaged communities that cannot afford to properly abandon their wells will receive financial aid to accomplish the task	Many residents in disadvantaged communities contacted about the program and significant interest show in the financial assistance and	Many eligible applicants found that qualify for the funding assistance and are located in qualifying areas	The number of wells abandoned through the program, the location of the wells and the amount of financial assistance	Financial assistance towards 100 well destructions in Kaweah River Basin IRWM disadvantaged communities

KAWEAH RIVER BASIN IRWM GROUP 2011 IMPLEMENTATION GRANT PROPOSAL

Kaweah Delta WCD

Project Goals	Desired Outcomes	Output Indicators	Outcome Indicators	Measurement Tools and Methods	Targets
		available County amnesty		provided	
Better understand groundwater quality of domestic wells in disadvantaged communities	Identification of areas of concern for water quality issues in specific disadvantaged communities	Many residents in disadvantaged communities contacted about the program and significant interest show in the water quality tests	Water Quality information generated by certified laboratories for areas of the County that little information is available for	Results from targeted water quality testing, information mapped geographically so that trends can be seen	50 water quality tests subsidized by the project for domestic well owners in disadvantaged communities
Address the most critical water quality issues for local disadvantaged communities	Feasible solutions developed for up to three of the top water quality concerns in engaged disadvantaged communities	Work with local residents of identified disadvantaged communities accept that the problem is significant and are motivated to address it	Work with engineering consultant on feasible alternatives for water quality issues develops reasonable, cost effective and implementable solutions	Generation of up to three feasibility studies, presentations to local communities, decision whether to proceed with preliminary engineering reports	Up to three feasibility studies completed for the top priority water quality concerns in engaged disadvantaged communities
Develop fundable project for the most critical water quality issues for local disadvantaged communities	Fundable projects with appropriate level of supporting information developed for up to three of the top water quality concerns in engaged disadvantaged communities	Work with local residents of identified disadvantaged communities whom accept that the problem is significant and are motivated to address it	Work with engineering consultant on feasible alternatives for water quality issues develops reasonable, cost effective and implementable solutions	Generation of up to three preliminary engineering reports, presentations to local communities, plan for how to acquire funding assistance	Up to three preliminary engineering reports for the top priority water quality concerns in engaged disadvantaged communities